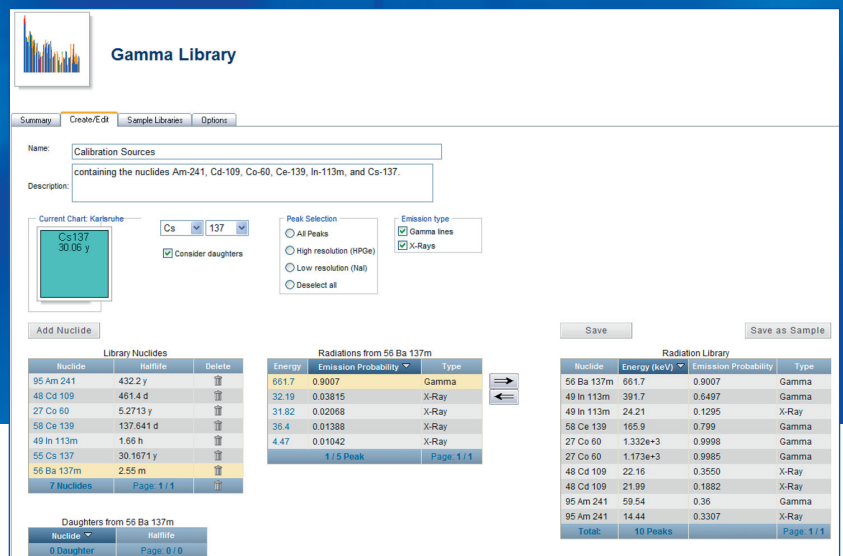


Gamma Library Creation



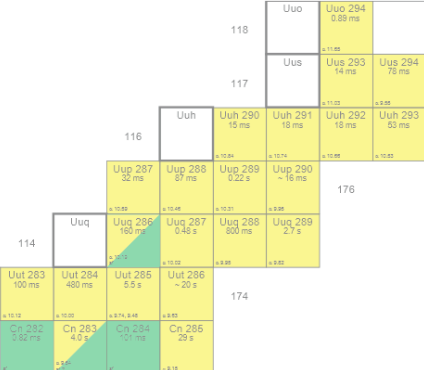
Gamma Library Creation

The library creation module can be used to create nuclide libraries using the latest internationally evaluated nuclear data. In addition to text formats, some proprietary formats (e.g. GammaVision) are also supported. Such libraries are required for example for radionuclide identification programs such as the WESPA (web spectrum analyser) module in Nucleonica. The libraries can be created using a range of commercial software, but usually the data (which includes nuclide, energies, emission probabilities, $T_{1/2}$, etc.) has to be entered by hand. Also the underlying databases may not be up to date with the most recent nuclear data. Using the Gamma Library Creation module in Nucleonica for this purpose makes life easier.

Create/Edit

The library creation interface is shown above. Before a new library can be created the nuclide list has to be filled with the desired nuclides. A new nuclide is added to the nuclide list by selecting the desired nuclide in the element and isotope combo boxes and clicking the *Add* button. A nuclide can be removed from the nuclide list by selecting the nuclide in the nuclide list and clicking the delete icon. The nuclide list is cleared by clicking the delete icon at the bottom of the list. In the example shown, a nuclide library for calibration sources is being created. The list of nuclides and the radiation library is shown. A new nuclide, Cs137 has just been added. If the *consider daughters* box is checked, it can be seen that Cs137 has the daughter Ba137m which is a strong gamma emitter with a main emission at 661.7 keV. Clicking on this daughter, the energies and emission probabilities of Ba137m will be transferred to the central grid. From this point, the main gamma lines can be selected and transferred to the *Radiation Library*.

The central grid lists all the gamma and X-ray energies and emission probabilities in the Nucleonica database. Depending on which radio button is checked in the *Peak Selection* box, either one or more emission lines are highlighted. The Peak Selection box allows the user to specify all peaks, or a subset of the peaks depending on which type of detector is being used. By clicking on the arrow icon, the highlighted radiations are transferred to the *Radiation Library*. At this point the library can be saved.



DID YOU KNOW

- The gamma library creation module provides a web-based interface for library creation.
- Spectral data can be chosen from the latest internationally evaluated nuclear data in the Nucleonica, 8th Table of Isotopes, or JEFF3.1 relational databases.
- The libraries can be saved as text files (for use in Nucleonica and other applications) and some proprietary formats (e.g. GammaVision).

In the *Summary* tab (overleaf), the list of gamma libraries together with the creation dates can be seen. Since the Calibration Source library has just been created, this is shown highlighted in the grid. In the *Download* column, there are two icons. On selecting one of these icons – the tooltip shows the text “GammaVision” Library – the library can be saved in GammaVision format. The other icon allows the user to save the library as a text file (for use in Nucleonica applications).

In the *Sample Libraries* tab, a list of pre-defined libraries is given. As an alternative to creating a library from “scratch”, the user can then select and edit one of the existing libraries.

In the *Options* tab, the user can select the relational database from which the basic spectral data is to be taken: either Nucleonica, the 8th Table of Isotopes, or JEFF3.1. There is also the possibility to select the minimum branching ratio for daughter products. Clearly there is no sense in including small branching ratios since this will result in very small quantities of a particular daughter. The default value use is 0.01. This implies daughters with a branching ratio less than 1% will be omitted in the list of daughter products. Finally there are boxes for selection of gamma peaks for both high and low resolution detectors. In these boxes, the minimum and maximum energies can be specified together with the low-er limits on the emission probabilities.

More information can be found on the Nucleonica wiki at www.nucleonica.com/wiki

ID	Name	Date Modified	Download	Delete
(Create a new Library)				
6	Calibration Sources	19.08.2010, 11:38:08		
5	Medical Library	08.07.2010, 16:15:27		
1	U235 + Pa231	08.07.2010, 11:28:27		
Total: 3		Page: 1 / 1		

Database:

Min. Branching ratio for daughters:

Peak selection: high resolution detectors

Min. Energy: keV

Max. Energy: keV

Min. Emission probability: % of E.P. of strongest line

Min. Emission probability: % of E.P. of strongest higher energetic line

Peak selection: low resolution detectors

Min. Energy: keV

Max. Energy: keV

Min. Emission probability: % of E.P. of strongest line

Min. Emission probability: % of E.P. of strongest higher energetic line